ADVANCES IN BUILDING EDUCATION
INNOVACIÓN EDUCATIVA EN EDIFICACIÓN

Building student training based on the analysis of scientific articles

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HIGHLIGHTS

- A model of complementary training of the student in the subject 'Materials' based on the search and reading of scientific publications is proposed.
- The proposed model is voluntary and does not have a negative impact in any case on the final mark of the subject.
- The success of the model lies in enhancing the motivation and personal interests of the students
- The results obtained show that students capable of facing this challenge acquire useful skills in the Final Degree Project and in their future professional life.

ABSTRACT

This work presents and values a model of complementary activity to the students training based on monographic works carried out from the analysis and review of scientific publications. This model promotes an extra motivation in those students with a real interest in learning beyond the basic content included in the subject program. In most cases, this proposal generates an important attraction when facing a type of unknown information.

Firstly, a basic introduction to the problem is developed; after that, a selection of a coherent number of articles or communications is done, analysing the key contributions on the subject at hand; and finally, conclusions are stated. Exceptionally, it is proposed that students add a section including real cases observed in their daily environment (e.g., new products, pathologies and damages, execution systems).

Keywords: *Scientific journals; monograph; research; complementary training.*

1. INTRODUCTION

The training activity, developed with an innovative character, aims to provide complementary training for students of the Building Degree by reading scientific journals. The development of monographic works is a complementary resource usually used by teachers in order to force students to delve into some specific topics. Thus students have the possibility of gain a broader understanding of the topic than the commonly knowledge implemented at the university classes [1].

The incorrect use of the accessible information on the web leads, in many cases, to meaningless works based on uncritical search for information, limiting the student's ability to analyse and reflect on the subject. Additionally, these works without sense, which come in many cases from copying paragraphs or entire texts of external work, should be corrected by professors that face issuing an evaluation without really knowing the repercussion that the work has had on the training of the students [2].

The realization of monographs based on the analysis of articles published in scientific journals has been promoted in the framework of the subject 'Materials II' in the ETSIE (Higher Technical School of Building Engineering), from the University of Seville. This model allows to avoid some of the problems previously mentioned, while helping students to become familiar with texts that have a structure and language completely different from those they usually use. Likewise, it is intended that the approach to the subject of the work has a novel, innovative, attractive and much more varied perspective than that to which students are accustomed.

The general approach of the works starts from a broad proposal of topics that are left to the free choice of the student. The proposed topics deal with specific issues concerning the subject, avoiding general issues at all times. Each topic or block of topics is accompanied by a list of journals and keywords that facilitates the students the search for information on the chosen topic.

Firstly, a basic introduction to the problem should be exposed and developed; after that, a selection of a coherent number of articles or communications, which the student must analyse assessing the fundamental contributions that authorship manifests on the subject in question, is done; finally, a section of conclusions that summarizes all the results of the analysis is include. Exceptionally, it is proposed that the information prepared could be accompanied by real cases that students can observe in their daily environment (e.g., new products, pathologies and damages, execution

systems), so that a vision as pragmatic as possible of the work carried out is achieved.

It could be concluded that this monographic work model has as its main objective to achieve an extra motivation in those students with a real interest in complementary learning, beyond the basic subject of a program. It also generates an important attraction to face, in most cases, an unknown type of source of information such as scientific articles.

2. METHODOLOGY

The methodology followed is based on the selection of specific topics selected by the professor due to their relevance on the field and according to new materials and/or technologies, to awake a particular interest in the students. This selection is linked to the innovative nature of the themes, their reflection in the behaviour of materials and construction elements, the application of unique solutions, etc. At all times this first step obviates generalist issues and support voluntary proposals from students that want to choose a specific topic based on a personal interest [3].

The works should only be carried out individually or in pairs. This limitation is intended to ensure involvement in the investigation and a fair distribution of work. Previous experiences lead to discard groups of more than two students because they do not guarantee an equity in the valuation of participation within the team and makes evaluation difficult.

Once the general approach of the proposal has been stated, a list of scientific publications in Spanish and English is presented. It serves the students to carry out a selective search for publications related to the topic on which they are going to work. With the intention of properly focusing the search, a series of guidelines are offered on the use of keywords as an element of localization of publications, as well as web pages that can be used as search engines (e.g., Google scholar, Researchgate or World Wide Science).

At this point, and once the work is in progress, mentoring sessions are established for its follow-up and orientation. Finally, the presentation mode is agreed with the student.

The experience has shown that a conventional oral presentation in the classroom accompanied by digital support is usually the simplest, although there is an alternative consisting of designing a poster that collects all the information of the work. This alternative, similar to the one used in scientific congress all over the world, allows a long-term exposition and a greater projection than the one reduced to the scope of the group in the classroom.

3. RESULTS

3.1. Attitude.

The purpose defined as the objective of this proposal of teaching innovation is to explore new ways of self-motivation in students. In this case, it has started from the basis of the huge volume of information available to students and that is less and less used. There is a growing tendency to limit the sources of information when studying, often limiting itself to class notes -most of the time provided by the professor- that should be broken.

Students from the Building degree tends to become more easily familiar with a certain technical language: project report, opinions, expert reports, budgets, and so on; however, it is difficult for them to assume the need to become familiar with the scientific text. In the field of building materials, the mastery of scientific language is essential for a full approach to matter; In addition, from the point of view of the professional practice, there are numerous occasions in which the building technician demands a scientific study: damage analysis, alteration mechanisms, conservation products, quality controls on-site, ... Therefore, it is important to show these search tools and this

scientific literature from multidisciplinary collaborations that facilitate useful information in the student future professional life.

A main issue when analysing the results of this initiative is to see how the student faces the investigation for the first time [4]. Applied research allows them to immediately show experimentation in providing solutions in the construction and building sector and excites them by showing less conventional or known methods. Theoretical research generates another equally interesting alternative that leads the student to consider the scientific and technological background behind the products and solutions.

Analysing the development of the proposal it is important to consider that the number of students participating is not particularly high. Facing a completely unknown activity is a non-easy step that for students that generates a certain distrust about their ability to assume the task. That is why it is important to consider the interest in learning and the proactivity in the face of training, factors previously mentioned [5]. The student ceases to be a spectator, as it happens with other activities, to become an actor who decides on the task to be performed, since the subject on which to work is by own decision and never imposed. At this point it should be highlight hat the vast majority of students who participate in the activity present a positive attitude and maximum involvement.

It is necessary to reflect on the causes that motivate the student. Traditionally, it has been considered the need to motivate students at all cost, to seek and show interest in the different subjects. The vision with which this model of activity is assumed starts from the denial of that assumption. Student should not be motivated; students should feel motivated by themselves. Obviously, there will be subjects that arouse greater interest than others, that is unquestionable; depending on the case, the function of the professor is to excite about knowledge or to clearly convey the need to know a subject that is less pleasant. Of course, the mood or discouragement with which it is faced is something that is born of the student himself. Therefore, the result obtained from this activity is especially relevant, due to the multiplier effect observed in the motivation of the students who participate in it.

It is very important to highlight how the translation and adaptation of this work project to the subject of Final Degree Project has given some truly interesting results. The academic and personal maturity of students who are finishing the studies and their clearer and more practical vision of their immediate future, has permit to transform the work done for the end-of-degree memory into scientific articles. In certain cases, after evaluating the research developed and value the relevance of the work some students are proposed to continue working on the topic until reaching a higher objective. In case these students agree with the proposal, other teachers will be incorporated to the project to provide it with greater solvency. In all cases in which the student has been offered this possibility, the response has been positive and that has led to the publication of three articles in JCR indexed journals, which gives an idea of the value of the work developed [6, 7, 8].

3.2. The evaluation.

This proposal is based on the personal will of the student to deepen in the subject on which he will work and the attributions derived from it. Thus, the evaluation of the activities, tasks and presentations done must take into account that these works must be outside the general assessment of the subject ‘Materials II’ [9].

Experience indicates that the student who decides to do this work must be clearly told that the evaluation of this activity will never be negative. The voluntary nature of the work implies that in no case will it be an obstacle in the final grade, always seeking a comprehensive evaluation process [10]. This is also an incentive to accept the proposal. Based on this premise, the work carried out will have a positive evaluation - in the event that it deserves it - and the influence on the final marks can be assessed, or it will have no impact on the final marks (i.e., the voluntary work will not be taken into account if the quality is not worthy of a positive evaluation).

Curiously, it is necessary to insist on this issue, since the students must start the work with the certainty that in no case will they be harmed by it. Obviously, the limitation of the number of students to a maximum of two per job strengthens, to some extent, this trust in mutual support.

4. CONCLUSIONS

The model presented of training and learning of the student from the Building degree, based on the analysis of scientific articles has been shown as a very interesting complement, as long as the involvement of the students who participate arises from a personal motivation for the deepening in the subject of study.

The students who are clear about their motivation and their interest in the subjects of Materials understand the importance of scientific research. Working with scientific publications enables the incipient development of skills in the handling of documentation and also allows to acquire a broader vision on how to face professionally the problems derived from construction materials, their behaviour and durability.

The experiences derived from the adequacy of these activities in the subject of the Final Degree Project have been highly satisfactory. Students who face this challenge acquire better skills to face professional work and, at the same time, improve their professional curriculum in those cases in which they are capable of preparing a scientific publication under the supervision of the expert teacher.

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